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(54) METHOD AND APPARATUS FOR CONTINUOUSLY ENCLOSING A FILLER MATERIAL IN A WRAPPER STRIP

(71) We, HAUNI-WERKE KORBER & Co., K.G, a German Company of 14/22 Kampchaussee, 2050 Hamburg 80-Bergedorf, Germany do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method and apparatus for continuously enclosing a filler material in a wrapper strip and is concerned in particular with the production of a continuous filter rod as used in the tobacco industry. The invention is concerned with improvements in or modifications of the invention (hereafter referred to as the main invention) described in U.K. Patent Specification No. 1,282,173.

Filter rods are today produced mainly be continuous rod procedures and in general a pre-treated lap or stream of filter material is enclosed in a wrapper strip at least one edge of which is gummed and bonded in overlapping relation. With the high rod speeds usual today the gum has insufficient time to harden to an extent such that the freshly joined seam has sufficient strength to ensure that it does not open out. Rapid hardening of the gum is of special importance with resilient filter materials consisting for example of cellulose acetate fibres or the like, as is usual today, since it is compressed during the wrapping operation, and because of its resilience it exerts a relatively great bursting force on the wrapper strip surrounding it. This problem arises even when using hot melt adhesives, which term is intended to cover adhesives of all kinds which are made active by the action of heat.

According to one aspect of the main invention there was provided a method for continuously wrapping a rod-like filter product pertaining to the tobacco industry comprising enclosing a continuous stream of a filter material in a continuous wrapper strip one edge of which is coated with a hot melt adhesive to form a joint thereby producing a continuous rod, and causing the wrapped rod to traverse a cooling device to which a fluid cooling medium is supplied for maintaining a continuous low temperature through which the wrapped rod is guided.

According to a second aspect of the main invention there was provided a device for continuously wrapping a rod-like filter product pertaining to the tobacco industry, comprising means for feeding a continuous wrapper strip with a continuous stream of a filter thereon through a rod shaping means, means for applying a hot melt adhesive to one edge of the wrapper strip to form a seam joint by means of said adhesive, and a cooling device through which the wrapped rod is caused to pass, and means for supplying a fluid cooling medium to said device to maintain a continuous low temperature at the point where the wrapped rod traverses the cooling device.

The manner in which the main invention was realised, as described in Specification No. 1,282,173 with reference to the drawings thereof, suffered from the disadvantage that a relatively large, and therefore expensive, cooling capacity was required since the heat dissipated included that generated in the rod-shaping means as a result of friction.

According to a first aspect of the present invention there is provided a method of producing a continuous filter rod product comprising a continuous compressible filter material and an outer wrapper strip having an adhesive lap joint in which a hot melt adhesive is applied to one edge of the wrapper which is then closed around the filter material and the rod so produced is caused to pass through a guide incorporat-

ing a low temperature cooling element engaging only the overlapped seam area of the rod.

According to a second aspect of the present invention there is provided apparatus for continuously wrapping a continuous, compressible filter material, comprising means for feeding a continuous wrapper strip with a continuous stream of filter material thereon through a rod shaping means, means for applying a hot melt adhesive to one edge of the wrapper strip to form a seam joint by means of said adhesive, and a cooling device through which the wrapped rod is caused to pass for cooling the wrapper strip only in the region of said seam joint.

Such a construction of the cooling device has the advantage that no special means need be provided for removing heat from the region of the wrapped rod which lies outside the region of the hot melt adhesive coating, being the region where a particularly intensive development of heat can occur for example as a result of friction between a conveyor belt for the filter rod and the rod-forming means. Such a cooling device can therefore be made relatively small and have a comparatively small cooling capacity.

According to a further development of the invention a heated applicator device can be provided for supplying the hot melt adhesive to the wrapper strip, preferably in stripes.

A particular problem in the application of hot melt adhesive to a wrapper strip in a rod machine consists in the fact that the hot melt adhesive should be applied in a stripe exactly up to the edge, but that care must be taken that the melted hot melt adhesive does not flow over the edge. If this happens ther is the danger of soiling the rod-forming means.

This problem is overcome according to a further development of the invention by the fact that the applicator device is arranged at a distance from the rod-forming means. The applicator device can then be a nozzle the outlet of which is located at the edge of the wrapper strip.

Uniform distribution of the hot melt adhesive and exact application up to the edge is obtained if the nozzle is set at such an angle relatively to the wrapper strip that the hot melt adhesive has a flow component in the direction of the edge at the application point and a flow component opposite to the direction of movement of the wrapper strip. The nozzle is preferably so arranged relatively to the wrapper strip that the angle between the flow direction of the hot melt adhesive and a line perpendicular to the tangential surface of the wrapper strip at the application point and/or in the direction of movement of the wrapper strip lies between 0 and 20°.

Several embodiments of apparatus according to the present invention will now be described with reference to the accompanying drawings wherein:

Fig. 1 shows the rod-forming section and the associated guide parts of a filter rod machine for producing filter rods and incorporating a separate heat source for activating stripes of hot melt adhesive.

Fig. 2 shows a cooling device in side view for cooling only the overlap region of the wrapper strip,

Fig. 3 is a section on the line III-III in Fig. 2,

Fig. 4 shows an applicator device for applying hot melt adhesive to a wrapper strip in the flat condition along one edge, and

Fig. 5 shows a view of the applicator device of Fig. 4 as seen in the direction of the arrow A.

Fig. 1 shows a filter rod-forming means 1 being part of a filter rod machine not otherwise shown, for example of the type KDF made by the present applicants. The filter rod-forming means 1 consists of a forming section 2 and an associated guide section 3. Filter material 6 consisting for example of cellulose acetate filaments is fed to the forming section 2 by means of a nozzle-like funnel 4, the filter material being pre-treated in a part of the filter rod machine not shown. Such a treatment section of a filter rod machine, which does not form part of the present invention is described for example in U.S. Specification No. 2,900,988.

The rod-forming means 1 is traversed by an endless feed belt and forming belt 7 which is guided over guide rollers 8 and 9 and over tensioning rollers 11, 12, 13, the belt 7 being driven by one of the said rollers. A wrapper strip 14 for the filter rod is guided over the forming belt 7 and is withdrawn from a reel 16. Three stripes 17, 18, 19 of an adhesive capable of being activated by the action of heat, hereinafter referred to as a hot melt adhesive, is preliminarily applied to the wrapper strip. Such hot melt adhesives may be for example the product sold by Bostik G.m.b.H. of Oberursel, Germany under Type 1194. A heat source 21 in the form of an infrared radiant heater 23 connected to a power source 22 and located beneath a parabolic mirror 24 is arranged above the feed path of the wrapper strip.

The forming section 2 is arranged so that initially the forming belt 7 with the wrapper strip 14 placed thereon is bent to U-shape in the zone A and in the zone B a top member 26 presses down part of the wrapper strip 14. The top member 26 is

set back again in the zone C and in this zone a further top member 27 presses down on to the already finished filter rod body the other part of the wrapper strip 14 bearing the edge to which the hot melt adhesive stripe 17 has been applied.

The guide section 3 which comprises two parts 3*a*, 3*b* with corresponding grooves suitable for receiving the filter rod, has the purpose of guiding the finished filter rod 28 so that its shape is maintained during the period of hardening of the hot melt adhesive. The guide roller 8 is followed in the direction of movement D of the filter rod by a cutter device, not shown, for cutting off finished filter rods from the continuous filter rod 28.

In operation the driven forming belt 7 draws the wrapper strip 14 from the reel 16 and feeds it through the rod forming means 1. The infra-red heater 23 heats the hot melt adhesive stripes 17, 18, 19 so that they are activated, i.e. made adhesive. The filter material 6 passes continuously through the funnel 4 from which it is deposited on the wrapper strip 14 from an opening in the under side of the funnel. After folding of the wrapper strip 14 around the filter material 3 in the forming section 2 the finished filter rod 28 is guided through the guide section 3 where the hot melt adhesive stripe 17 is cooled so far that the filter rod seam can no longer open out. In this arrangement the strip 17 at the edge of the wrapper strip 14 forms the overlap joint while the stripes 18 and 19 serve to provide a bond between the wrapper strip 14, and the filter material 6.

Figs. 2 and 3 show a cooling device 61 which cools the wrapped rod 28 only in the region of the joint 62 of the wrapper strip 14 at which is located the stripe 17 of hot melt adhesive. The cooling device 61 embodies a cooling surface 63 which is arranged in the upper part 3*a* of the guide member 3 and consists of a metal, such as copper, having good heat conductivity. The cooling surface 63 comprises the tip of an elongated shoe 64 which is formed from a cooling pipe 66.

The cooling pipe is supported in an insulating block 67 and is traversed by cooling liquid introduced and carried off by means of connections 68, 69. The cooling liquid may be water or brine or an organic cooling medium such as that sold under the Trade Mark FRIGEN. A cooling or refrigerating device, not shown, may be provided for cooling the liquid to a suitable temperature, for example below 0°C.

The forming belt 7 runs in a circular recess in the lower guide member 3*b* and serves for feeding the wrapped filter rod through the guide member 3 and being received in a circular recess therein. The elasticity of the cellulose acetate filter material in the filter rod produces substantial friction between the forming belt 7 as well as the filter rod 28 not surrounded by the forming belt, and the guide member 3. The heat so produced with the apparatus according to Figs. 2 and 3 does not have to be carried away by the cooling device since the cooling surface 63 is only arranged to cool the region of the wrapper strip 14 in which the joint is formed and in which the hot melt adhesive must be hardened. This rapid, low temperature cooling ensures the formation of a sound joint despite the relatively high temperature attained by the filter rod as a whole.

Figs. 4 and 5 show the arrangement of an applicator 151 with a nozzle 151*a* which is connected to a pipe 151*b* and by which the hot melt adhesive is applied to one edge 152 of a wrapper strip 114 in such manner that the hot melt adhesive 117 is applied in a particularly uniform way and exactly up to the edge 152. The nozzle 151*a* is placed for this purpose at such an angle relatively to the wrapper strip 14 that the hot melt adhesive has a flow component 153*a* in the direction towards the edge 152 and away from the opposite edge 152*a* at the application point B and a flow component 153*b* opposite to the direction of movement (corresponding to the arrow C) of the wrapper strip 14. The nozzle 151*a* is advantageusly so placed relatively to the wrapper strip 114 that the angle α between the flow direction D of the hot melt adhesive leaving the nozzle 151*a* and the line E perpendicular to the tangential surface of the wrapper strip 114 at the application point lies between 0 and 20°. Moreover the nozzle 151*a* is advantageously so placed relatively to the wrapper strip 114 that the angle β between the flow direction of the hot melt adhesive leaving the nozzle 151*a* and the direction of movement (corresponding to the arrow C) of the wrapper strip 114 lies between 0 and 20°.

With the arrangement of the applicator nozzle 151*a* in the manner described relatively to the wrapper strip 114 and at a spacing from the forming member 102 it is readily possible to set the apparatus so that the hot melt adhesve flows to the edge 152 of the wrapper strip 114 without the danger that it flows over the edge and thus smears any part of the machine, for example the forming member 102. Since moreover the wrapper strip 114 can be very exactly guided before entry into the forming member 102 (in contrast to a forming device where the guide cannot be so exact) it is possible to arrange the outlet of the nozzle 151*a* close to the edge 152. The hot melt adhesive is moreover satisfactorily spread on to the upper surface

of the wrapper strip 114 with the nozzle arrangement described.

The advantage of the invention lies primarily in the fact that the gummed seam can harden sufficiently even with very high-speed machines, without it being necessary to provide long heating sections, as is necessary when using the usual type of liquid gum. With a cooling device which cools only the seam region of the filter rod where the hot melt adhesive is located, the cooling capacity required can be relatively small.

Attention is directed to the features claimed in Specification No. 1378170 (25456/74) divided from the present Application.

WHAT WE CLAIM IS:—

1. A method of producing a continuous filter rod product comprising a continuous compressible filter material and an outer wrapper strip having an adhesive lap joint in which a hot melt adhesive is applied to one edge of the wrapper which is then closed around the filter material and the rod so produced is caused to pass through a guide incorporating a low temperature cooling element engaging only the overlapped seam area of the rod.

2. Apparatus for continuously wrapping a continuous, compressible filter material, comprising means for feeding a continuous wrapper strip with a continuous stream of filter material thereon through a rod shaping means, means for applying a hot melt adhesive to one edge of the wrapper strip to form a seam joint by means of said adhesive, and a cooling device through which the wrapped rod is caused to pass for cooling the wrapper strip only in the region of said seam joint.

3. Apparatus as claimed in claim 2, wherein the cooling device comprises a thermally conductive member extending parallel to the path of travel of the wrapped rod and having a contact surface for contacting the seam joint, and a conduit adapted for the passage of a coolant therethrough and thermally connected to said thermally conductive member.

4. Apparatus according to claim 2 or 3, including an applicator device for supplying a hot melt adhesive or a stripe or stripes of such adhesive to the wrapper strip.

5. Apparatus according to claim 4, wherein the applicator device is arranged at a point spaced from the rod shaping means in which the wrapper strip is caused to enclose the filter material.

6. Apparatus according to claim 4 or 5, wherein the applicator device comprises a nozzle the outlet of which is disposed at the edge of the wrapper strip.

7. Apparatus according to claim 6, wherein the angle of the nozzle relatively to the wrapper strip is chosen so that at the application point the hot melt adhesive has a flow component towards the edge and a flow component opposed to the direction of movement of the wrapper strip.

8. Apparatus according to claim 7, wherein the angle between the flow direction of the hot melt adhesive and the line perpendicular to the tangential surface of the wrapper strip at the application point and/or the angle between the said flow direction and the direction of movement of the wrapper strip lies between 0 and 20° in each case.

9. Apparatus according to any one of claims 2 to 8, wherein a heat source is provided for activating the hot melt adhesive applied to a wrapper strip drawn from a reel, which heat source is arranged upstream of the rod shaping means.

10. A method of producing a continuous filter rod product, substantially as herein described with reference to the drawings.

11. Apparatus for continuously wrapping a continuous, compressible filter material, substantially as herein described with reference to and as illustrated in the accompanying drawings.

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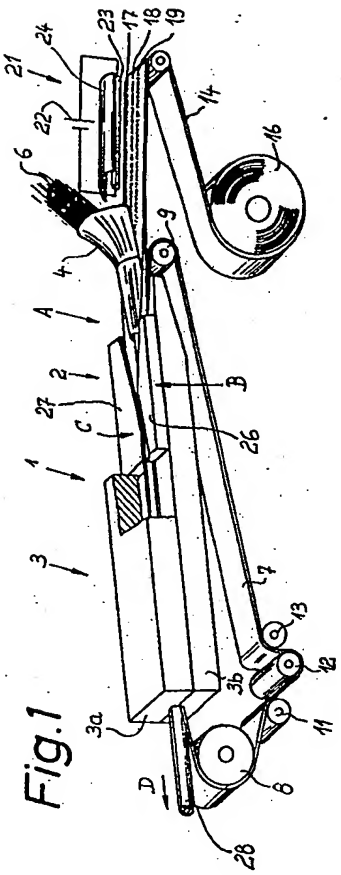

Fig.1

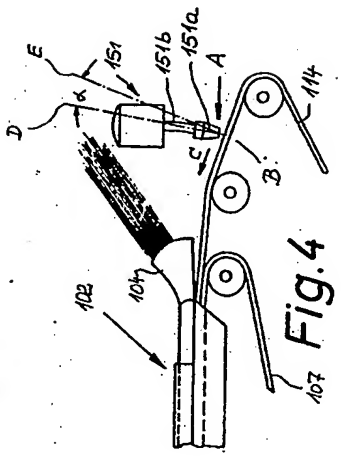

Fig.4

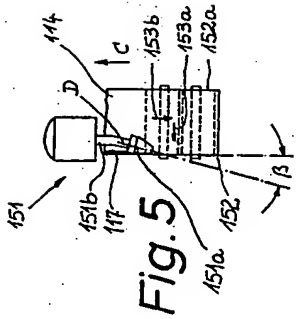

Fig.5